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A revision of the genus *Herdonia* Walker (Lepidoptera : Thyrididae, Sicolodinae)

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Abstract Twenty species of the genus *Herdonia* Walker, including fifteen new species, are described or redescribed, with illustrations of moths, male antennae and genitalia.

Key words Thyrididae, Sicolodinae, Opulini, *Herdonia*, antennal rami.

Up to the present only five nominal taxa of the genus *Herdonia* have been known: *osacesalis* Walker, 1859, from Silhet, Bangladesh, *osacesalis candida* Gaede, 1932, from Papua New Guinea, *papuensis* Warren, 1907, from Papua New Guinea, *margarita* Inoue, 1976, from Japan and *acaresa* Zhu & Wang, 1992, from Jiangxi, China. In this paper *H. osacesalis candida* will newly be upgraded as a valid species. Thus, all the five known species and fifteen new species will be described or redescribed, with photographs of moths, male antennae and genitalia.

However, specimens I could examine are rather meager and accordingly discovery of some more species is anticipated in future, especially from the Sundaland and the Papuan Subregion of the Oriental Region.

I express my hearty thanks to the following persons and institutes for a loan or a gift of valuable specimens. The depository of specimens, including the type-series, will be shown at the bottom of data of specimens by abbreviated names, excepting those in my private collection. Dr E. W. Diehl, Sumatra; Mr T. Endo, Tokyo; Dr O. Karsholt, Zoological Museum, Copenhagen (ZMC); Dr H. Kezuka, Tokyo; Mr Y. Kishida, Tokyo; Mr T. Masui, Takamatsu (TM); Dr S. Moriuti, College of Agriculture, University of Osaka Prefecture, Osaka (UOP); Dr M. Owada, Department of Zoology, National Science Museum, Tokyo (NSMT); Bro. A. Pinratana, Bangkok; Dr R. Sato, Niigata; Dr D. Stün- ing, Zoologisches Forschungsinstitut und Museum A. Koenig, Bonn (ZFMK); Dr J. H. R. Thiele, Dettenheim (JHRT); Dr D.-y. Xue, Institute of Zoology, Academia Sinica, Beijing (IZAS).

After the manuscript of this paper had been completed, I received from Mr M. Shaffer, Department of Entomology, British Museum (Natural History), London (BMNH), the type specimens of *Herdonia papuensis* and *candida* (with the genitalia slide of the latter) from New Guinea preserved in his Museum as a loan. Since they are not identical with any other species recorded in this paper, I will give redescrptions of the two taxa, with their photographs, in order to present advantage for more extensive study on this genus. Here I offer my hearty thanks to Mr Shaffer for his very kind advice and good offices.

Genus *Herdonia* Walker

Herdonia Walker, 1859: 963; Hampson, [1893]: 367; *id.*, 1897: 610; Seitz, 1912: 372; Gaede, 1932: 745

Palpus with 2nd joint upturned, 3rd naked, not reaching vertex of head, antenna thickened,

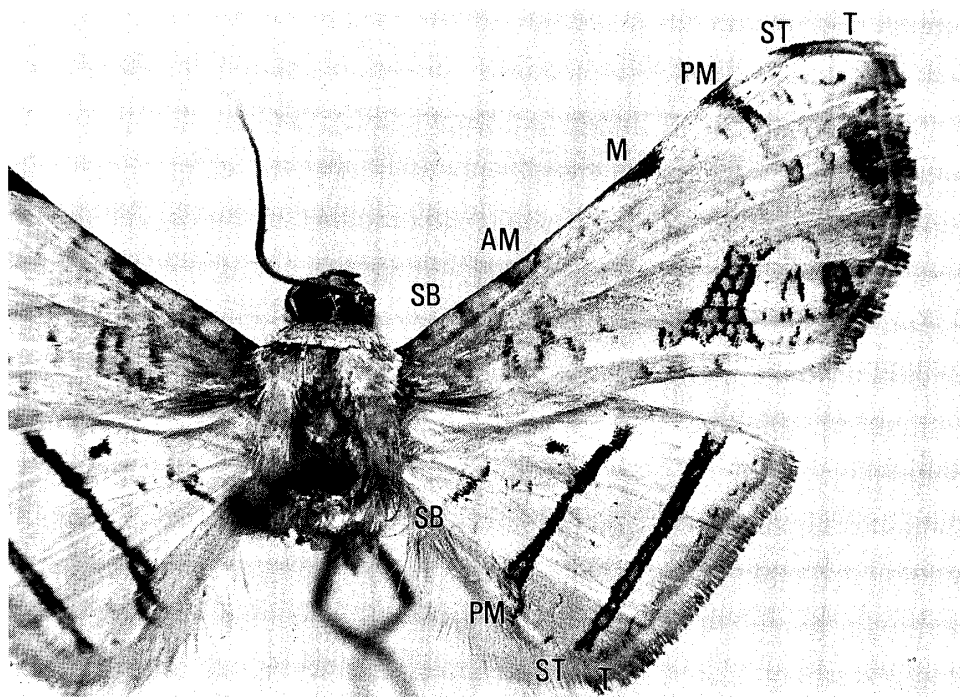


Fig. 1. Pattern element, *Herdonia pulchella* sp. nov. Abbreviations of fasciae: AM—antemedian, M—median, PM—postmedian, SB—subbasal, ST—subterminal, T—terminal.

lamine, dentate or unipectinate in male, simple and slender in female, its length about two-thirds of forewing, proboscis developed, unscaled, hindtibia with two pairs of spurs with a few exceptions, tarsi without paired spines at the base of each joint (Siculodinae, Opulini, cf. Whalley, 1971 : 84, 106), excepting several spines at inner area of 5th joint, hind tarsus longer than tibia.

Wings elongate ; forewing with costa weakly incurved at near end of cell, apex weakly or strongly falcate, termen gibbous at CuA_1 , cell about two-thirds of length of wing, R_1 from middle of dorsal margin of cell, R_2 , R_3 , R_4 , R_5 arising separately from near upper angle of cell, R_4 and R_5 rarely stalked, M_1 from above middle of discocellars, M_3 from lower angle a little below M_2 . Hindwing with apex weakly produced, termen nearly straight or weakly rounded off, excepting a weak excision below apex, $Sc+R_1$ running close to upper margin of cell, gradually diverging at the origin of R_s , R_s and M_1 separate at the origin, discocellars angled inward, M_2 , M_3 and CuA_1 equal in distant at cell.

Pattern element (Fig. 1). Forewing with subbasal, antemedian, median, postmedian, subterminal and terminal fasciae represented by black or blackish costal marks or dots, becoming vague posteriorly, sometimes reappearing at hindmarginal area as streaks. Hindwing with ground colour pearly white, subbasal, postmedian and subterminal fasciae consisting of a double lines, postmedian lines often forked posteriorly, sometimes subterminal lines quadruple.

♂ genitalia. Uncus stick-like, tip hooked, valva elongate, harpe a triangular plate placed mid-basal part, saccus roundedly produced, gnathos-ring complete, central process pointed or rounded at tip, juxta string-like, both sides lobed, aedeagus cylindrical, straightish or weakly arched, no cornutus. ♀ genitalia. Papilla analis broad, tips rounded, apophysis

posterioris nearly equal in length with papilla analis, apophysis anterioris a little longer, ostium very weakly sclerotized, ductus bursae and corpus bursae continuous, the former usually granular at near ostium, the latter globular or ovate, signum absent.

Type of the genus: *Herdonia osacesalis* Walker, 1859, by monotypy.

Distribution. India, Nepal, Bangladesh, Myanmar, Thailand, China, Japan, Sundaland, Philippines, New Guinea.

Hampson ([1893] : 367) described that vein 10 (R_2) of forewing absent and illustrated the venation of *H. osacesalis* (fig. 248) as such, but he (1897) subsequently described that veins 7, 8, 9, 10 from near upper angle of cell and emended the venation (fig. 6). His description and illustration of male antenna ([1893]) was "almost simple", but he (1897) afterwards said "antennae with short uniseriate branches in male" and revised the figure from "simple" to "uniseriate". As mentioned later, the male antennae vary according to species. Hampson [1897] might have observed *osacesalis* and some other species as a single species.

Dalla Torre (1914 : 8) lists three species from the Neotropical Region as members of *Herdonia*, but they should be assigned to a different genus. Watson & Whalley (1975 : 218) say, "It is probable, when the species are more closely examined, that the Oriental species will be placed in a different genus from the American species".

From the structure of male antennae the species of *Herdonia* will be divided into three sections in this paper for convenience of identification. The last three species whose males are unknown to me will be placed in Sect. 4 tentatively, an unavoidable treatment.

Section 1. Antenna laminate : *osacesalis*, *sundana* sp. n., *hainanensis* sp. n., *approximata* sp. n., *candida*, *apoensis* sp. n., *pulchella* sp. n.

Section 2. Antenna dentate : *acutapex* sp. n.

Section 3. Antenna unipectinate : *margarita*, *thaiensis* sp. n., *gigantea* sp. n., *virginea* sp. n., *thielei* sp. n., *brunneola* sp. n., *margarodes* sp. n., *acaresa*, *deminuta* sp. n. Ratio of length of antennal rami and width of shaft is measured at 10th-15th joints from scape.

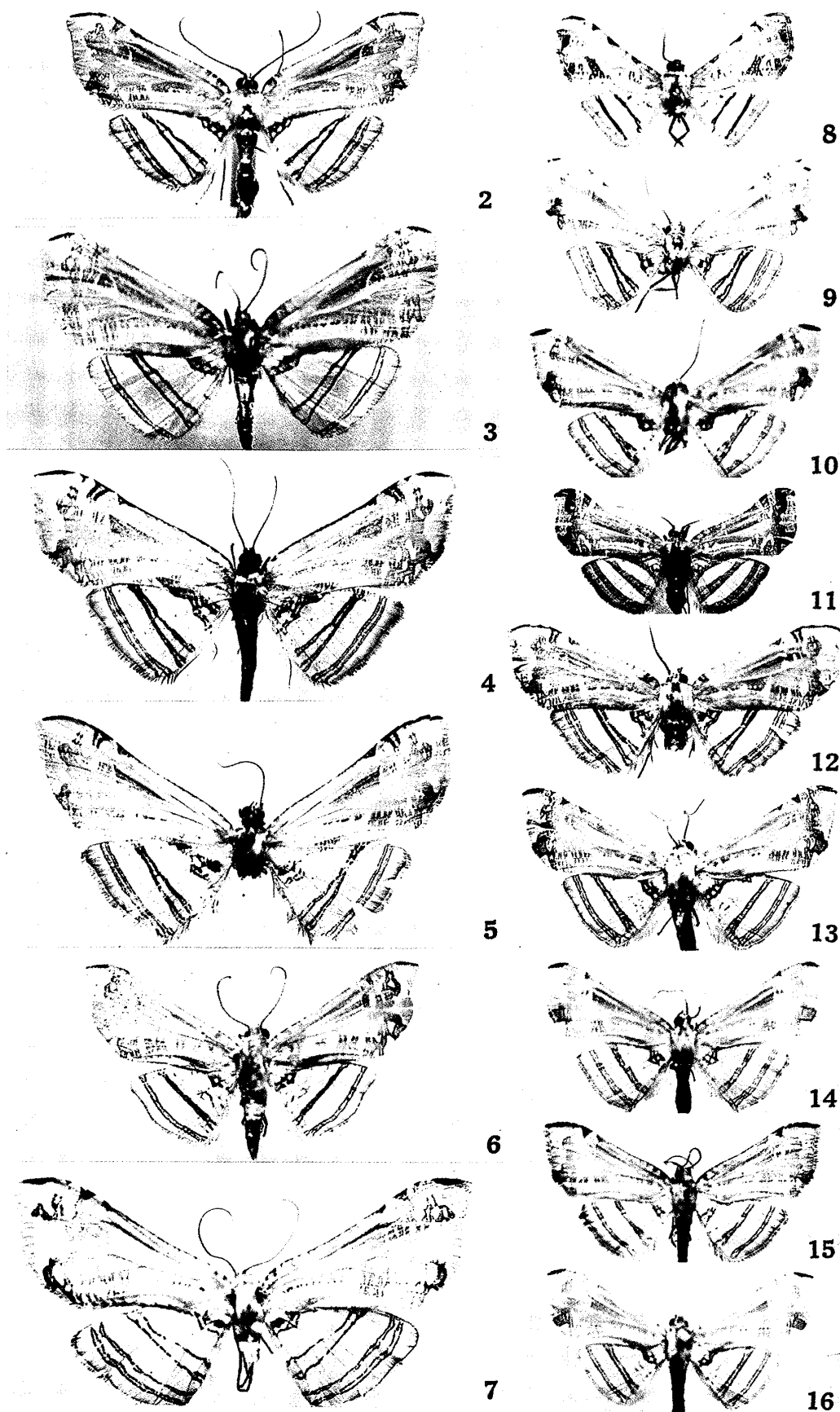
Section 4. Male antenna unknown : *papuensis*, *celebensis* sp. n., *curiosa* sp. n.

Herdonia osacesalis Walker (Figs 2, 17-19)

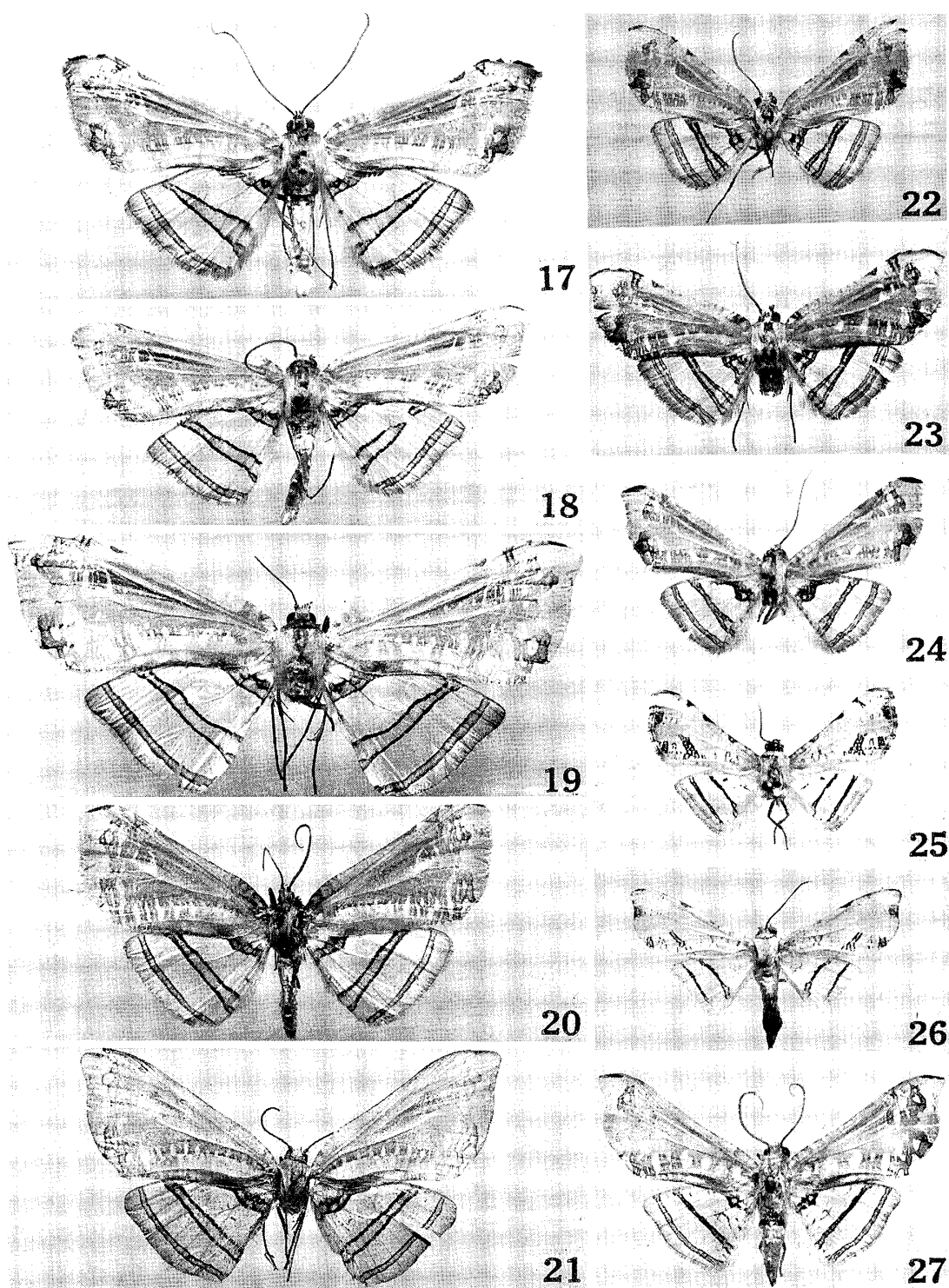
Herdonia osacesalis Walker, 1859 : 964 ; Moore, 1867 : 90 ; Felder & Rogenhofer, 1875 : pl. 134 : 4 ; Hampson, [1893] : 367, fig. 248 ; *id.*, 1897 : 610, fig. 6 ; Swinhoe, 1900 : 406 ; Seitz, 1912 : 372, pl. 50 : e (a very poor fig.) ; Gaede, 1932 : 745.

Male antennal lamellae (Figs 46, 47) less than twice width of shaft. Face dark grey, white at ventral and lateral areas, thorax above grey strongly mixed with white scales, abdomen white, terminal half faintly red-brown, red-brown band at basal area, which is the continuation of subbasal fascia of hindwing.

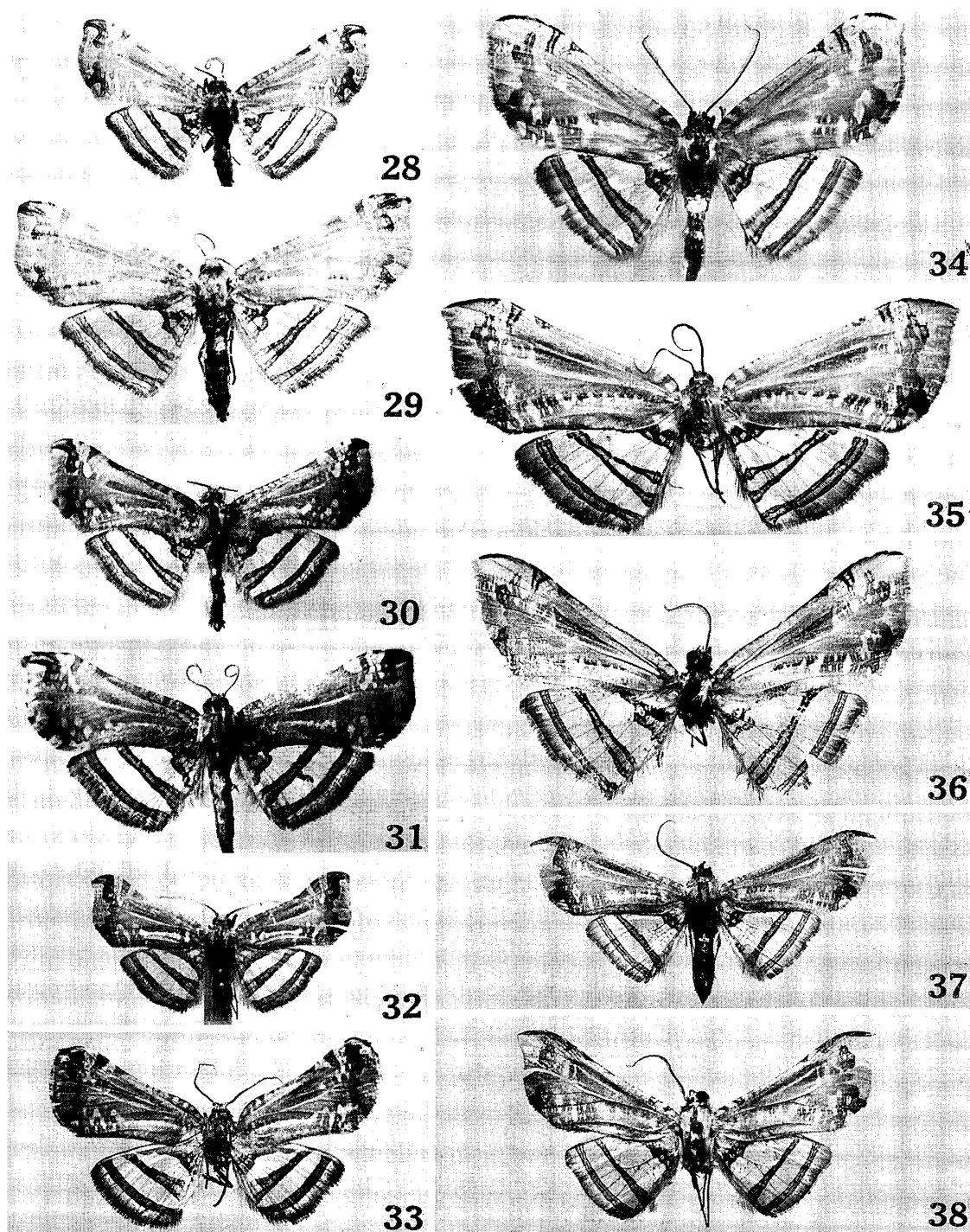
Forewing faintly red-brown, cell and outside of it and ventral area greyish, a white bar on discocellulars, irregular white spots and dashes below cell from base to termen, costa narrowly blackish brown, at apical area it becomes a blackish mark which is the commencement of terminal fascia, apical area whitish, postmedian fascia represented by dark brown double dashes at costa, reappearing below cell as two double streaks, subterminal fascia commencing from a small blackish dot at costa, then irregularly clouded with brownish after interruption at white area below costa, darkened and produced to termen



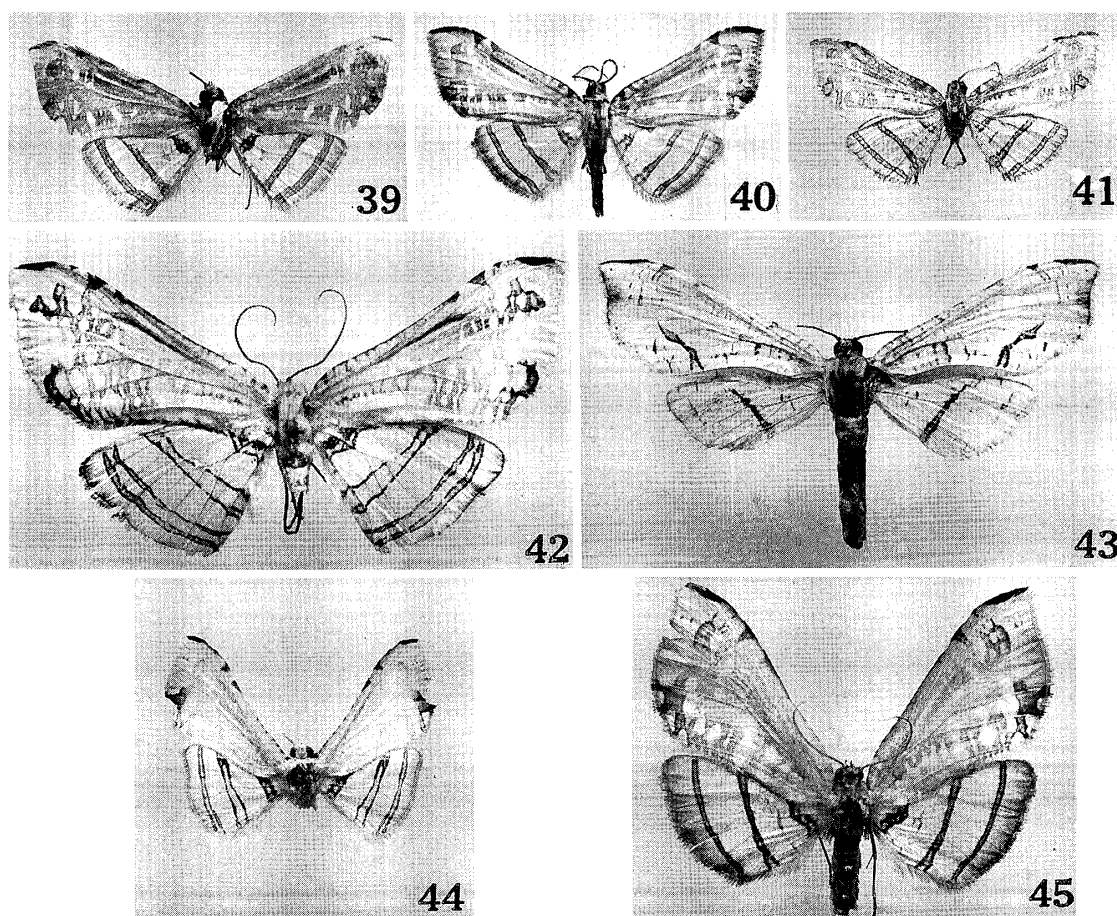
Figs 2-27. *Herdonia* spp. 2. *H. osacesalis* Walker, ♂. 3. *H. sundana* sp. nov., holotype ♂.
4. *H. gigantea* sp. nov., holotype ♂. 5. *H. virginea* sp. nov., holotype ♂. 6. *H. acutapex*



sp. nov., holotype ♂. 7. *H. celebensis* sp. nov., holotype ♀. 8. *H. pulchella* sp. nov., holotype ♂. 9. *H. approximata* sp. nov., holotype ♂. 10. *H. apoensis* sp. nov., holotype ♂. 11. *H. thaiensis* sp. nov., holotype ♂. 12. *H. hainanensis* sp. nov., holotype ♂. 13. *H. thielei* sp. nov., paratype ♂. 14. *H. brunneola* sp. nov., paratype ♂. 15. *H. margarodes* sp. nov., holotype ♂. 16. *H. deminuta* sp. nov., paratype ♂. 17. *H. osacesalis* Walker, ♂. 18. Ditto, ♂. 19. Ditto, ♀. 20. *H. sundana* sp. nov., holotype ♂. 21. Ditto, paratype ♀. 22. *H. approximata* sp. nov., holotype ♂. 23. *H. hainanensis* sp. nov., holotype ♂. 24. *H. apoensis* sp. nov., holotype ♂. 25. *H. pulchella* sp. nov., holotype ♂. 26. Ditto, paratype ♂. 27. *H. acutapex* sp. nov., holotype ♂.



Figs 28-38. *Herdonia* spp. 28. *H. margarita* Inoue, holotype ♂. 29. *Ditto*, paratype ♀. 30. *Ditto*, ♂ (China). 31. *Ditto*, ♀ (China). 32. *H. thaiensis* sp. nov., holotype ♂. 33. *Ditto*, paratype ♀. 34. *H. gigantea* sp. nov., paratype ♂. 35. *Ditto*, paratype ♀. 36. *H. virginea* sp. nov., holotype ♂. 37. *H. thielei* sp. nov., paratype ♂. 38. *Ditto*, holotype ♂.



Figs 39-45. *Herdonia* spp. 39. *Herdonia brunneola* sp. nov., holotype ♂. 40. *H. margarodes* sp. nov., holotype ♂. 41. *H. diminuta* sp. nov., holotype ♂. 42. *H. celebensis* sp. nov., holotype ♀. 43. *H. curiosa* sp. nov., holotype ♀. 44. *H. candida* Gaede, lectotype ♂. 45. *H. papuensis* Warren, holotype ♀.

at CuA₂, tornal area usually spotted with red-brown, margined externally with blackish line. Hindwing opalescent white, subbasal, postmedian and subterminal blackish brown double lines, the subbasal filled-in with red-brown, its outer margin wavy, postmedian broadened posteriorly, forked at near hindmargin, inside of the double lines white or faintly brownish, subterminal lines parallel, inside pale red-brown, rarely two more lines running just inside of the lines, termen shaded with red-brown, leaving narrow white area between subterminal lines. Under surface more strongly marked, costa of forewing more thickly black, subcostal area orange yellow, veins posterior to cell also tinged with the same colour. Length of forewing: ♂ 21-26 mm, ♀ 35 mm. It cannot be decided that the female I examined is of the normal size or an unusually large specimen.

♂ genitalia (Fig. 63). Uncus stick-like, tip hooked, expanded basally, gnathos a narrow ring, nearly pointed at central process, valva elongate, smooth margined, apex rounded, harpe a triangular plate, ventral angle hooked, saccus produced, tip rounded, aedeagus shorter than valva, cylindrical. ♀ genitalia (Fig. 79). Ostium not or extremely weakly sclerotized, ductus bursae membranous, longer than oblong corpus bursae.

Specimens examined. Holotype, ♂: BANGLADESH: Silhet, BMNH. INDIA: Inde Anglaise Pedong, Région de Darjeeling, Chasseurs indigènes, 1935, 1 ♂, ZFMK; Khasi Hills,

vi. 1973, 4 ♂, *ex* H. Kezuka. NEPAL: Taplejung, 3,350 m, 2. vii. 1962, 1 ♂ (T. Yasuda); Godavari, Kathmandu, 23. vi. 1991, 1 ♂, *ex* T. Haruta. THAILAND: Doi Suthep, 1,200 m, Chiang Mai, 25. x. 1983, 1 ♂ (M. Owada), NSMT; Doi Pui, 1,300 m, Chiang Mai, 1-4. ix. 1987, 1 ♂ (Moriuti, Saito, Arita, Yoshiyasu), UOP; Khao Yai Natn. Park, 700 m, Nakhon Nayok, 29. ix -6. x. 1984, 1 ♂ (Karsholt, Lomboldt, Nielsen), ZMC; Doi Inthanon, Chiang Mai, 7. x. 1985, 1 ♂ (A. Pinratana); *ditto*, ix & x. 1986, 4 ♂ 1 ♀, *ex* T. Masui.

Distribution. Northeast India, Nepal, North Bangladesh, North Myanmar, North & Central Thailand.

Of fifteen specimens before me only one male has R_4 and R_5 of forewing stalked. Although Hampson ([1893]: 367) described that vein 10 absent, all the specimens I examined have five radials.

Herdonia sundana sp. nov. (Figs 3, 20, 21)

Closest relative of *osacesalis*, probably the Sundanian representative of it but male antennal lamellae (Fig. 49) more slender, nearly twice width of shaft. Face grey, blackish above and whitish below. Size, colour and maculation almost identical with *osacesalis*, but hindwing with apex less pronounced, termen from M_1 to CuA_2 rounded, less straightish than in *osacesalis*, consequently the double subterminal lines gently curved along termen. In a sole female I examined the hindtibia has only terminal spurs. Length of forewing: ♂ 21-23 mm, ♀ 24 mm.

♂ genitalia (Fig. 64). Uncus a little more slender, saccus also more slender, valva more elongate at apical half, harpe more sharply pointed at ventral angle, gnathos with central process much longer than in *osacesalis*, juxta produced dorsad at both sides, while in *osacesalis* it is very weakly lobed at sides. ♀ genitalia (Fig. 80). Ductus bursae less slender than in *osacesalis*, corpus bursae globular.

Specimens examined. Holotype, ♂: WEST MALAYSIA: Genting Highlands, 13. v. 1974 (H. Kezuka). Paratypes: data as holotype, 1 ♂. SUMATRA: Holzweg 2, 1,050 m, near Prapat, 4. vi. 1985, 1 ♂ (E. W. Diehl), *ex* J. N. R. Thiele. BORNEO: Kundakan, 1,000 m, Mt. Kinabalu, Sabah, 3-18. v. 1980, 1 ♀ (T. Hasegawa).

Distribution. Peninsular Malaysia, North Sumatra, Borneo. Possibly also found in Java.

Among 3 males and one female examined by me, 2 ♂ and 1 ♀ have R_4 and R_5 of forewing stalked.

Herdonia hainanensis sp. nov. (Figs 12, 23)

Male. Antennal lamellae (Fig. 50) narrower and longer than in the preceding two species. Colouration of wings nearly as in *sundana*, but readily distinguished from it by more broadly white apical and terminal area of forewing, postmedian blackish bars at costa as clear as in the preceding two, thus distal margin of subterminal clouding very clear, terminal black mark at costa narrower than in the two. Hindwing with termen nearly straight as in *osacesalis*, subbasal fascia weakly angled outward at ventral margin of cell, postmedian fascia quadruple, strongly expanded posteriorly, subterminal fascia also quadruple, termen brownish, white outer margin of subterminal fascia very narrow, but clear. Length of forewing: 19 mm.

♂ genitalia (Fig. 65). Uncus thicker than in *sundana*, shape of valva similar but ventral margin more deeply incurved at near apical area, harpe broader, ventral margin not smooth but dentate, ventral angle sharply pointed, gnathos similar to *sundana* but central process less slender, lobes of juxta very small as in *osacesalis*, aedeagus more slender.

Specimen examined. Holotype, ♂ : SOUTH CHINA : Jiang-feng, Hainan, 11. v. 1982, IZAS.

Distribution. Southeast China (Hainan).

***Herdonia approximata* sp. nov. (Figs 9, 22)**

Male. A close relative of *osacesalis*. Antennal lamellae (Fig. 51) as slender as in *hainanensis*, but shorter. Separated from *osacesalis* as follows: much smaller, length of forewing 16 mm. Forewing more or less paler, apical area more widely white, hindwing with postmedian fascia consisting of two double lines, forked and expanded posteriorly, subterminal fascia also two double lines of blackish brown, but inner lines interrupted on veins, termen nearly as straightish as in *osacesalis*.

♂ genitalia (Fig. 66). Uncus and valva shorter than in *osacesalis*, the latter broader apically, strongly swollen at middle of ventral margin, harpe elongate, ventral margin dentate, tooth at basal part very weakly produced, central process of gnathos stronger than in *osacesalis* but shorter than in *sundana* and narrower than in *hainanensis*.

Specimen examined. Holotype, ♂ : THAILAND : Kitchakut, ca. 500 m, Chanthaburi, 9. vi. 1983 (Kuroko, Moriuti, Arita, Yoshiyasu).

Distribution. Southeast Thailand.

***Herdonia candida* Gaede, stat. nov. (Fig. 44)**

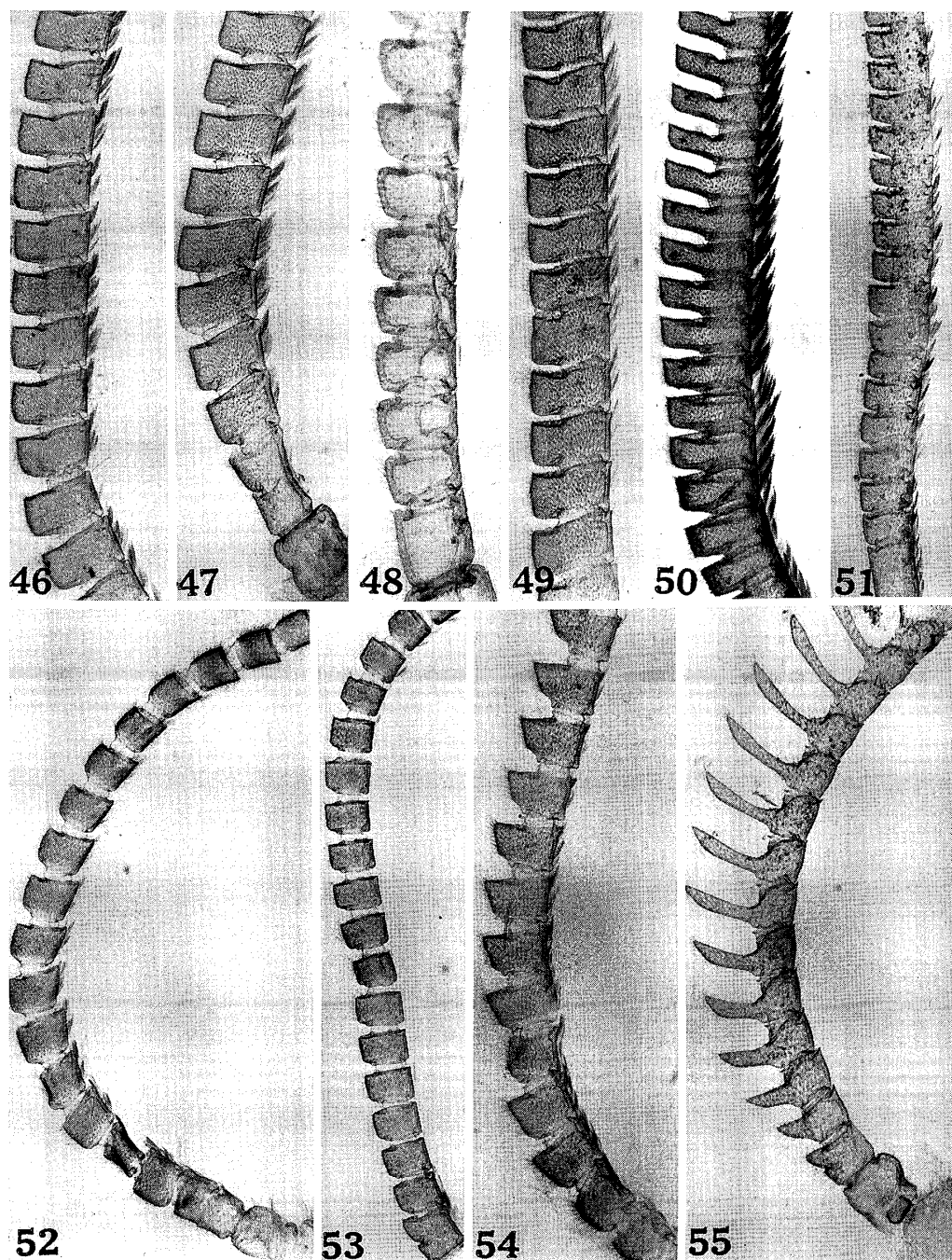
Herdonia osacesalis candida Gaede, 1932 : 745.

Male. Size and colour similar to *pulchella* sp. n. described below, but antenna (Fig. 48) much thicker as in *acutapex* sp. n. Forewing creamy white, not tinged with brownish as in *pulchella*, transverse fasciae almost vanished, represented at costa by median and postmedian triangular dark brown marks, subterminal dot and terminal black mark, termen (both sides broken at the end of SM₁) gently incurved from apex to SM₂, terminal brown fascia from SM₁ to tornus, margined with blackish brown, in cellule 1 it becoming a narrow band leaving white patch at tornus. Hindwing with subbasal, postmedian and subterminal fasciae, the latter two not blackish and not approximated each other as in *pulchella*, interspaces of the double lines white, terminal area white, termen and fringe pale greyish brown. Under surface, forewing with cell tinged with grey, lacking the characteristic postmedian fascia of *pulchella* as on above, hindwing almost identical with upper surface. Length of forewing : 16 mm.

♂ genitalia (Fig. 75). Uncus much more slender, valva much broader than in *pulchella*.

Specimen examined. Lectotype, ♂, here designated : Kumusi R., N. E. Brit. N. Guinea, low plev., viii-x 07 (A. S. Meek), BMNH.

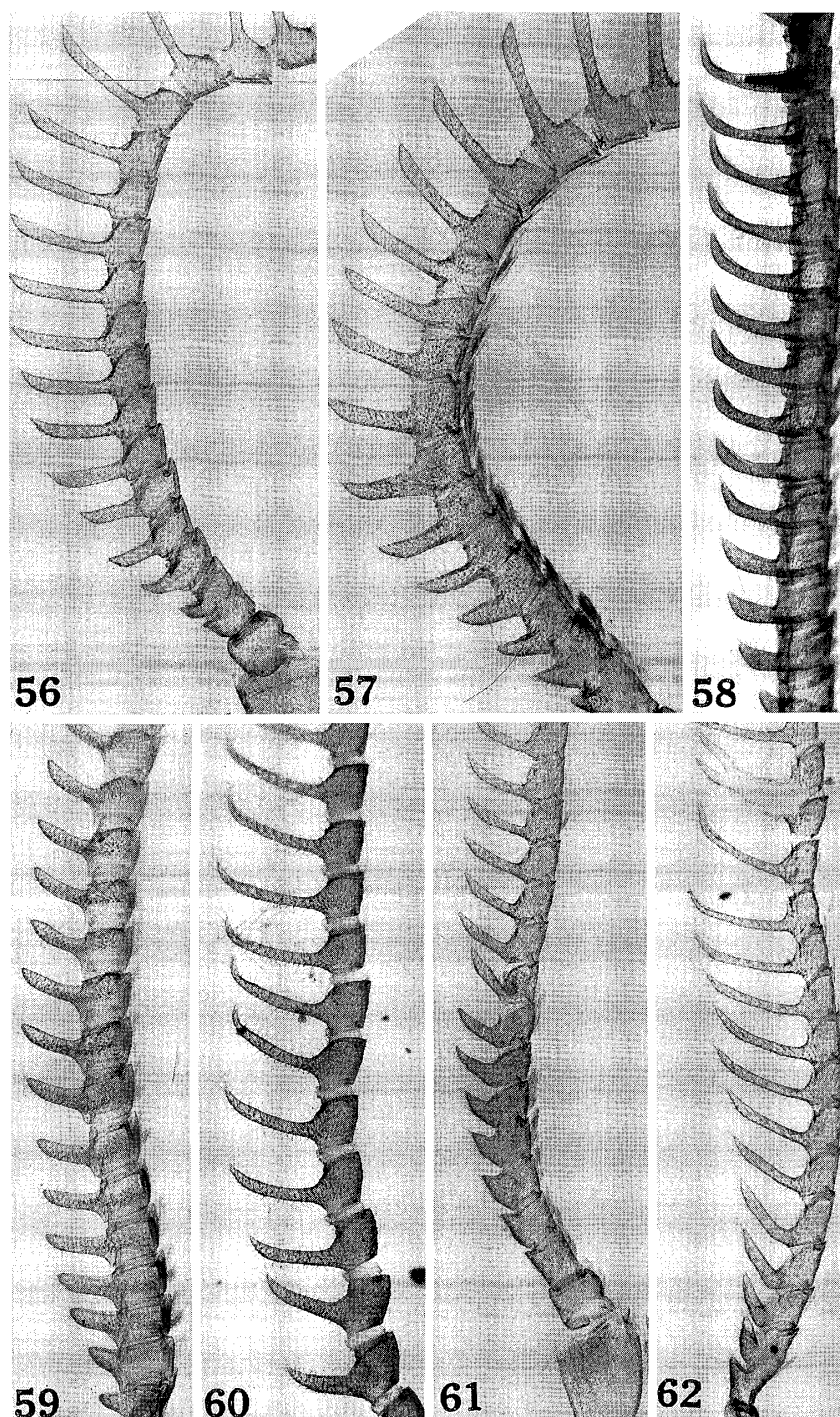
Distribution. Papua New Guinea.



Figs 46-55. Male antennae of *Herdonia* spp. 46. *H. osacesalis*. 47. *Ditto*. 48. *H. candida*. 49. *H. sundana*. 50. *H. hainanensis*. 51. *H. approximata*. 52. *H. apoensis*. 53. *H. pulchella*. 54. *H. acutapex*. 55. *H. margarita*.

***Herdonia apoensis* sp. nov.** (Figs 10, 24)

Male. Close to the preceding five species, but distinguished from them as follows. Antenna more slender, each lamella nearly quadrate (Fig. 52). Face brownish grey, white at lower half. Size nearly as *approximata*, length of forewing 17 mm. Colouration of wings as *osacesalis*, but forewing with apical-costal area with a heavier black mark, postmedian fascia very weak at costa, subterminal reddish brown clouding at dorsal area



Figs 56-62. Male antennae of *Herdonia* spp. 56. *H. thaiensis*. 57. *H. gigantea*. 58. *H. virginea*. 59. *H. thielei*. 60. *H. brunneola*. 61. *H. margarodes*. 62. *H. deminuta*.

smooth-margined, hindwing with postmedian and subterminal double lines containing blackish brown dashes, subbasal blackish brown band strongly swollen below cell, terminal red-brown shade thicker and broader than in *approximata*.

♂ genitalia (Fig. 67). Shape of valva more similar to *approximata* than to *osacesalis*, more elongate than the latter, ventral swelling weaker, gnathos broader than in the two, central

process much stronger, aedeagus nearly identical with that of *approximata*.

Specimen examined. Holotype, ♂ : PHILIPPINES : Mt. Talomo, 1,100 m, Apo Range, Upper Baracatan, Davao, Mindanao, 17-19. viii. 1985 (M. Owada), NSMT.

Distribution. Philippines (Mindanao).

Herdonia pulchella sp. nov. (Figs 8, 25, 26)

Male. Antennal lamellae (Fig. 53) more shortly produced from shaft than in *osacesalis*; similar to *apoensis* but each lamella a little oblonger. Face fuscous brown at upper half, whitish below. Forewing with termen more strongly gibbous at middle than in the preceding species, hindwing with apex nearly pointed, termen straight, tornus pronounced. Forewing white with faint red-brown hue, without greyish contamination in cell, costa spotted with black at commencement of subbasal, ante-, median and postmedian fasciae, postmedian double or triple lines black, running from M_3 to $1A+2A$, terminal fascia at costa blackish brown, terminal dark red-brown marks at M_1-M_2 and CuA_1-CuA_2 . Hindwing with a thin subbasal line below cell, postmedian and subterminal blackish brown lines straight, very slender, the former only a little expanded near hindmargin, becoming red-brown there, the latter running into tornus, termen pale red-brown, interspace between it and subterminal lines white. Length of forewing : 13-15 mm.

♂ genitalia (Fig. 68). Uncus very broad, valva much more elongate than in the preceding species, harpe elongate, small, with a ventral process directing inward, saccus semicircular, gnathos with broad arms, centre broadened, juxta much broader than in the preceding species, roundish at ventral margin, deeply incised at dorsal centre, aedeagus shorter than in the preceding species.

Specimens examined. Holotype, ♂ : THAILAND : Khao Luang Natn. Park HQ, 120 m, Nop Pitam, Tha Sala, Nakon Si Thammarat, 6-9. viii. 1987 (M. Owada), NSMT. Paratype : SUMATRA : Holzweg 2, near Prapat, 19. ix. 1985, 1 ♂ (E. W. Diehl), JNRT.

Distribution. South Thailand, North Sumatra. This species will eventually be found in Peninsular Malaysia and Borneo.

Herdonia acutapex sp. nov. (Figs 6, 27)

Male. Antenna (Fig. 54) dentate at basal one-third, but at middle part dentation becomes more slender like short unipectination. Face light brown at upper half, white below. Forewing with R_4 and R_5 stalked (2 ♂) or separate (1 ♂); apex falcate, termen deeply incurved below apex, then strongly gibbous, white spotting below cell more developed than in *osacesalis* and its allies, postmedian fascia at costa very weak, terminal fascia at costa greyish black, outer margin of subterminal clouding at costal area clear, straightish. Hindwing with postmedian and subterminal double lines slender, the former blackish, but filled-in with red-brown at middle, forked posteriorly, the latter containing blackish brown dashes, gently curved along termen. Length of forewing : 20-21 mm.

♂ genitalia (Fig. 69). Uncus very thick as in *pulchella*, valva rather short, apical area broader than in *osacesalis* like *apoensis*, gnathos broader than in *apoensis*, central process long, scobinate, harpe nearly as in *osacesalis*, aedeagus almost as slender as in *hainanensis*.

Specimens examined. Holotype, ♂ : BORNEO : Keningau, Sabah, 11. iii. 1985 (K. Na-

kamoto), NSMT. Paratypes: BORNEO: Poring, West coast, Sabah, viii. 1981, 1 ♂ (T. Yasuda), NSMT; Keningau, Sabah, iv -v. 1984, 1 ♂ (T. Hasegawa), *ex* T. Masui.

Distribution. North Borneo.

Herdonia margarita Inoue (Figs 28-31)

Herdonia osacesalis: Shirai, 1940: 129, fig.; Mutuura, 1957: 148, pl. 26: 773; *id.*, 1958: 20, fig. 1; Inoue, 1959: 232, pl. 165: 10, *nec* Walker, 1859.

Herdonia margarita Inoue, 1976: 154, pl. 4: 69 (male genitalia); *id.*, 1982: 307, pl. 36: 4 (holotype ♂); Miyata, 1983: 145

Herdonia papuensis: Zhu & Wang, 1992: 209, text-fig. 8, pl. 1: 8, *nec* Warren, 1907.

The longest antennal rami (Fig. 55) in male about twice width of shaft, gradually becoming short and apical ten joints nearly dentate. Face whitish grey-brown. Ground colour of both wings darker and maculation of forewing at apical area and subterminal area stronger than in *osacesalis*, from apex to M_1 where is a dark brown subterminal band, its distal edge deeply bent inward below apex, the band appearing again at ventral half, emitting a projection to termen at CuA_2 , leaving a pale brown mark at tornus, termen strongly gibbous at middle. Hindwing with termen nearly as straight as in *osacesalis*, apex a little produced, subbasal, postmedian and subterminal bands red-brown, the postmedian consisting of double black lines, interspace filled-in with yellowish brown, widened posteriorly, often forked at near hindmargin, pale area outside subterminal lines striated with blackish brown (this condition is one of peculiar characteristics of the present species together with the apical mark of forewing). Length of forewing: ♂ 15-19 mm, ♀ 16-22 mm.

♂ genitalia (Fig. 70). Uncus very slender, valva shorter and apical area narrower than in *osacesalis*, harpe a more elongate plate, ventral process narrower, saccus shorter, gnathos with central process a little longer than in *sundana*. ♀ genitalia (Fig. 81). Apophyses anterioris and posterioris shorter and broader than in *osacesalis* and *sundana*, ductus bursae nearly as long as in *osacesalis*.

Specimens examined. Holotype, ♂, and paratypes, 8 ♂ and 3 ♀, from Japan as recorded by me (1976) in the original description; Niigata, Tokyo, Kyoto, Hyōgo and Kagawa Prefectures and two more specimens from Niigata. CHINA: Shanghai, Prov. Kiangsu, 5. vii. 1929, 1 ♂; *ditto*, 18. vii. 1940, 1 ♀; *ditto*, 15. vi. 1941, 1 ♂ (H. Höne) and 10 other specimens from Shanghai (H. Höne); Shaowu, 500 m, Fukien, 12. v. 1937, 3 ♂; *ditto*, 6. vi. 1937, 1 ♂ (J. Klapperich), ZFMK.

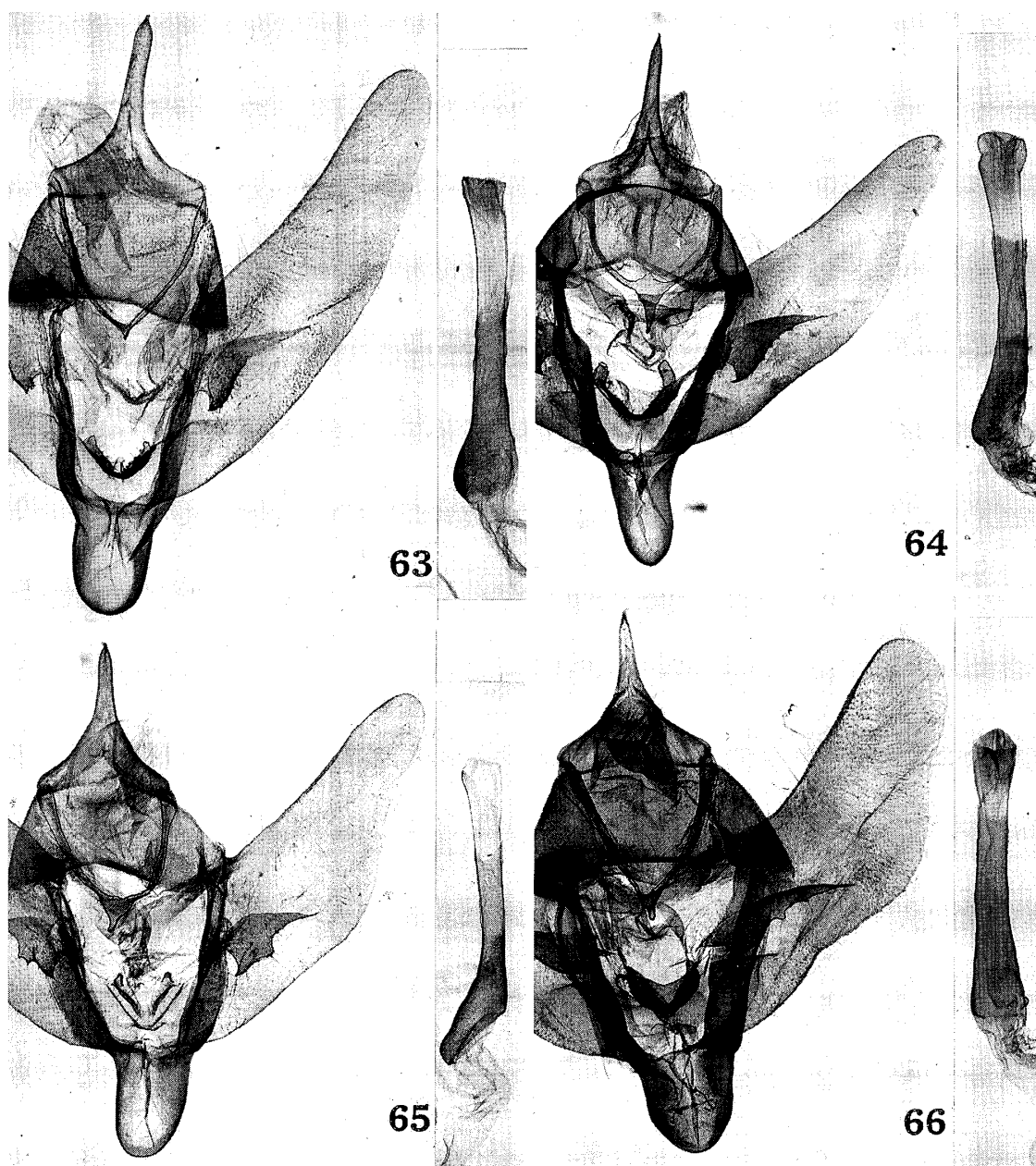
Distribution. East, Central & Southeast China, Japan (Central & Southwest Honshu, North Shikoku, North Kyushu).

In all the fourteen specimens from Japan and 2 ♂ 1 ♀ from China examined by me, the forewing has R_4 and R_5 separate.

The Chinese specimens recorded above have the ground colour of forewing and maculations of both wings darker and the apical mark of forewing clearer than the Japanese ones.

This is the only species of the genus whose immature stages were cleared (Mutuura, 1958).

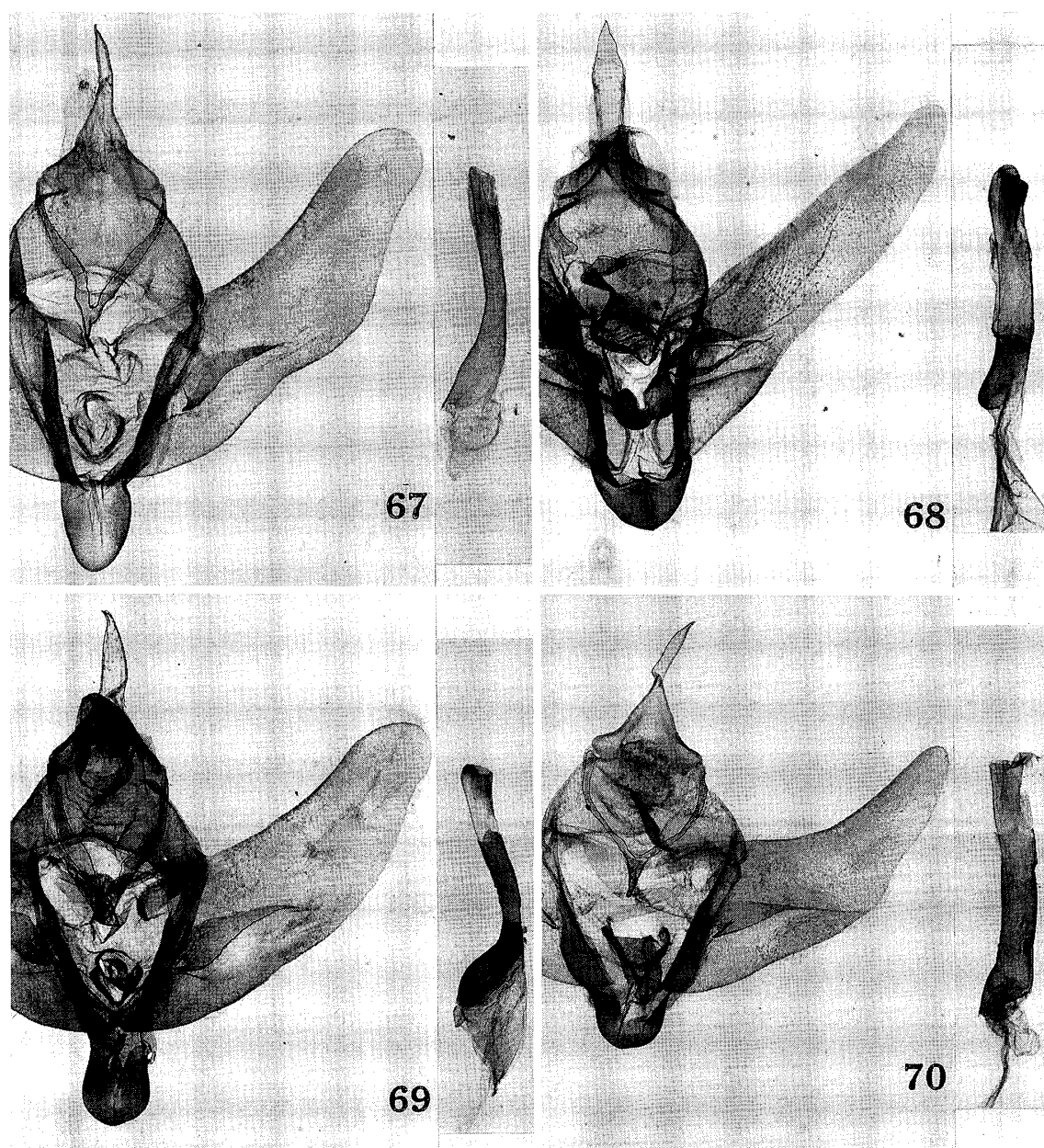
* This native plant in South China was named by Linnaeus as *indica* by misunderstanding.



Figs 63-66. Male genitalia of *Herdonia* spp. 63. *H. osacesalis* (HI Slide 14565). 64. *H. sundana* (14704). 65. *H. hainanensis* (IZAS). 66. *H. approximata* (15453).

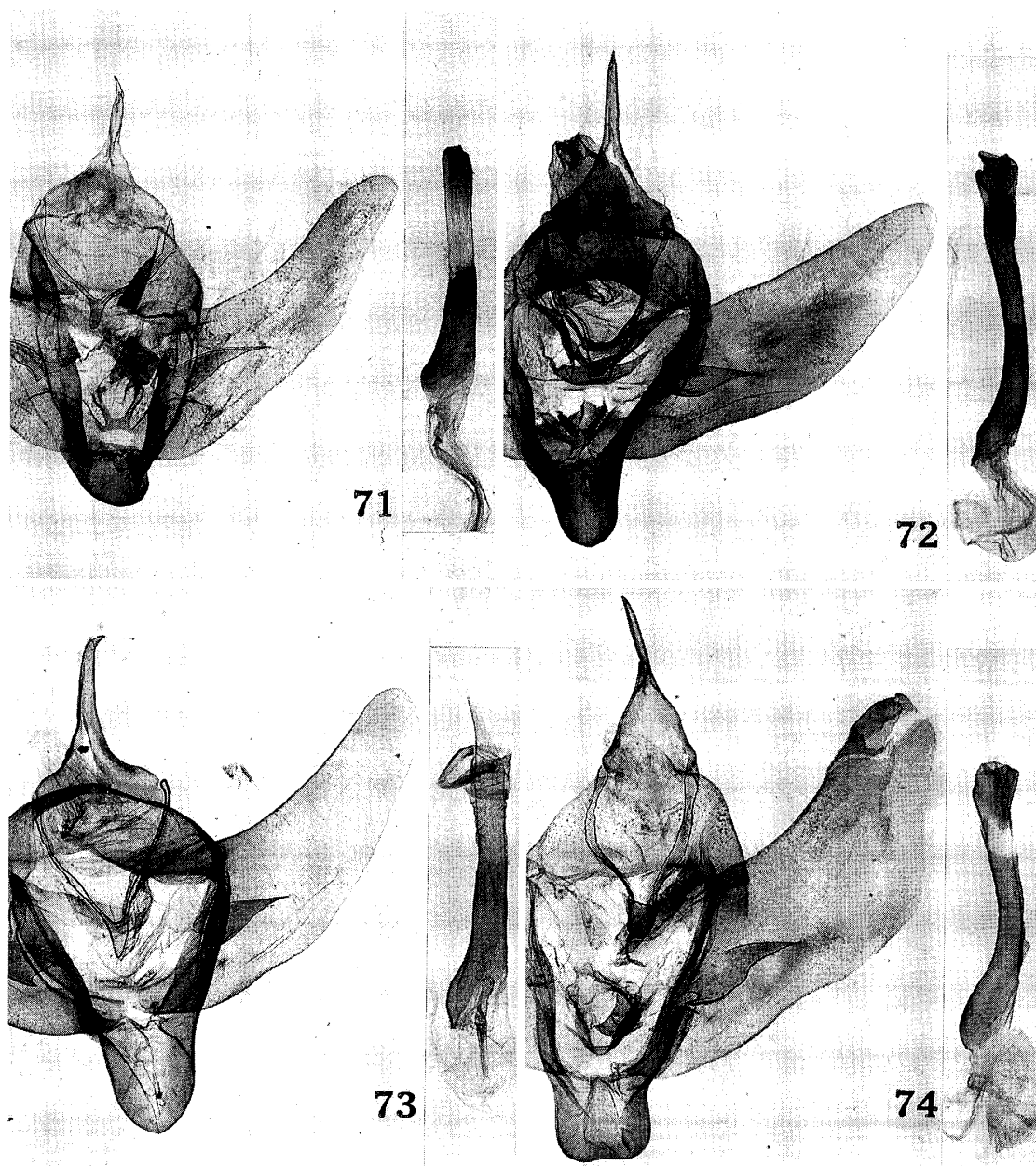
Larva is a twig-borer of *Lagerstroemia indica** (Lythraceae), a garden tree in Japan introduced from China. There are two indigenous species of *Lagerstroemia* in Japan: *subcostata* and *Fauriei* in Yakushima, Tanegashima, Amami-Oshima and the Ryukyu Islands, but no specimens of *Herdonia* have been secured from the southern islands. *H. margarita* has so far been collected at only residential areas of the mainland of Japan in June and July. Therefore, I presume that this species was introduced into Japan from China with its food-tree. The fact will be substantiated by the above recorded discovery of this species from China. Miyata (1983) also expresses the same opinion when he summarized collected spots of the moths of this species in Kyushu.

The specimen (♂) illustrated by Yang (1977: 252, pl. 10: 19) from North China as *H.*



Figs 67-70. Male genitalia of *Herdonia* spp. 67. *H. apoensis* (NSMT). 68. *H. pulchella* (NSMT). 69. *H. acutapex* (14586). 70. *H. margarita* (14568).

osacesalis is quite possibly identical with *H. margarita*, because wingspan he shows is 30-37 mm and male antenna is said to be unipectinate, and moreover the picture shows the characteristic forewing maculation of the present species. He also described that larva is a twig-borer of *Punica granatum* (Punicaceae). The native land of this plant is the Middle East and it was introduced into China as a garden tree a long time ago. The plant was brought to Japan from China and became one of very common garden trees in both countries. It is, therefore, presumed that the primary food plant of *margarita* is *Lagerstroemia* and the secondary *Punica*.

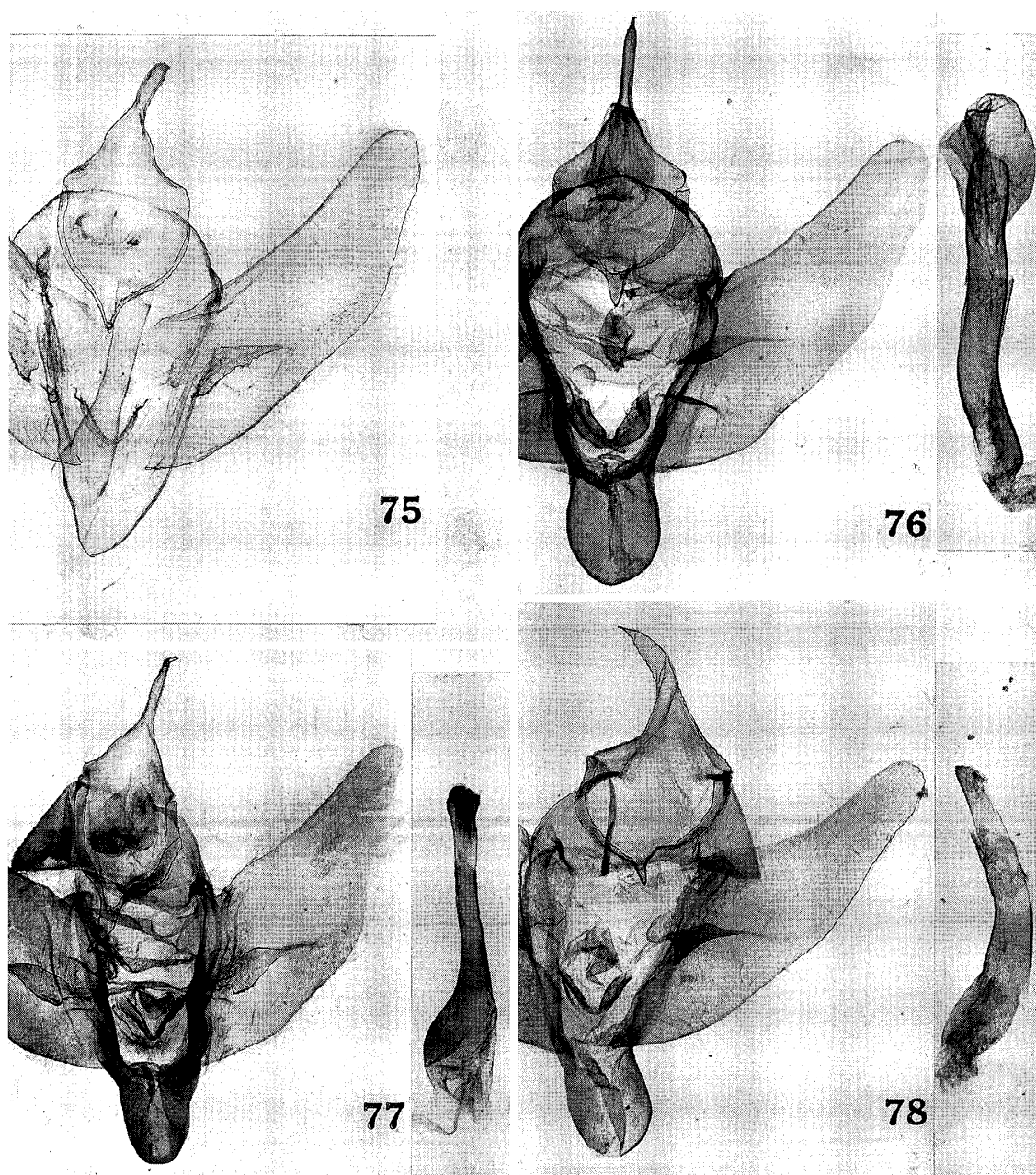


Figs 71-74. Male genitalia of *Herdonia* spp. 71. *H. thaiensis* (NSMT). 72. *H. gigantea* (15455). 73. *H. virginea* (IZAS). 74. *H. thielei* (14572).

***Herdonia thaiensis* sp. nov.** (Figs 11, 32, 33)

Antennal rami (Fig. 56) in male longer than in *margarita*, about two and half width of shaft. Size, shape, colour and maculation most similar to *margarita*, but more purplish in tint, the characteristic fuscous brown mark at apex and submarginal area of forewing clearly identical with *margarita*, hindwing with subbasal fascia smoothly incurved at middle, gently excurved posteriorly and closely approximated with postmedian line at hindmargin, blackish striae outside subterminal line weaker than in *margarita*, white areas more strongly iridescent with bluish colour. Length of forewing: ♂ 14-15 mm, ♀ 18 mm.

♂ genitalia (Fig. 71). Uncus a little more slender, valva with apical half more strongly



Figs 75-78. Male genitalia of *Herdonia* spp. 75. *H. candida* (BM Slide, Pyralidae 18262). 76. *H. brunneola* (14708). 77. *H. margarodes* (14571). 78. *H. diminuta* (14709).

narrowed, saccus more elongate and aedeagus more slender than in *margarita*, central process of ganthos shorter, tip more roundish than in *margarita*. ♀ genitalia (Fig. 83). Apophyses posterioris and anterioris much shorter, ductus bursae more slender than in *margarita*.

Specimens examined. Holotype, ♂ : THAILAND : Kao Saming, Trad, 16. viii. 1981 (H. Kuroko, S. Moriuti, Y. Arita, Y. Yoshiyasu). Paratypes : THAILAND : data as holotype, 2 ♂ ; Fang, 400 m, Chiang Mai, 15. v. 1983, 1 ♀ (Kuroko, Moriuti, Saito, Arita, Yoshiyasu) ; ditto, 13-16. ix. 1987, 1 ♂ (Moriuti, Saito, Arita, Yoshiyasu), UOP ; Khao Sok Natn. Park, 100 m, Surat Thani, Phanom, 10-11. viii. 1987, 1 ♂ (M. Owada), NSMT. N. SUMATRA :

Sindar Raya, 370 m, Mt. Simarson, 8-22. iii. 1992, 1 ♂, JHRT.

Distribution. North & South Thailand, North Sumatra.

In all seven specimens R_4 and R_5 of forewing separate as in *margarita*.

Herdonia gigantea sp. nov. (Figs 4, 34, 35)

Antennal rami (Fig. 57) in male about twice width of shaft. Face white ventrally, grey-brown dorsally, again white at base of antennae. Very large species, similar to *osacesalis* and *sundana*, but wings ampler, more strongly tinged with red-brown. Forewing with a double blackish bars at the commencement of postmedian fascia as clear as in *hainanensis*, apical-costal area strongly tinged with black, subterminal minute black dot at costa, red-brown clouding nearly complete, but vanished at near costa, terminal fascia represented by a heavy black mark at costa, termen darker than in *hainanensis*, but whitish at apical area in male. Hindwing with postmedian lines similar to *hainanensis*, subterminal two lines consisting of double lines as in *hainanensis*, interspace brown, terminal area red-brown, white area outside subterminal line very narrow, outer margin of subbasal fascia incurved at middle. Length of forewing: ♂ 24-26 mm, ♀ 27-30 mm.

♂ genitalia (Fig. 72). Uncus more slender than in *osacesalis*, valva more elongate, ventral margin gently gibbous, narrower towards apex than in *osacesalis*, gnathos ring very slender, central process tongue-shaped. ♀ genitalia (Fig. 84). Apophyses posterioris and anterioris nearly equal in length with *thaiensis*, being shorter than in *osacesalis*, ductus bursae and ovate corpus bursae nearly equal in length.

Specimens examined. Holotype, ♂: THAILAND: Nang Chin, Phrae, Lampang, 28. v. 1992, ex T. Endo. Paratypes: THAILAND: Khao Soi Dao, 400 m, Chanthanaburi, 7. vi. 1983, 1 ♂ (Kuroko, Moriuti, Arita, Yoshiyasu), UOP; Chiang Mai, vi. 1986, 2 ♀ (N. Koyama), ex T. Masui.

Distribution. North & Southeast Thailand.

In all four specimens the forewing has R_4 and R_5 separate. Distinguished from *osacesalis* and *sundana* by male antennal structure and subterminal lines of hindwing consisting of two double lines. Among the fifteen specimens of *osacesalis* only 2 ♂ show a similar feature: subterminal lines of hindwing quadruple.

Herdonia virginea sp. nov. (Figs 5, 36)

Male. Antennal rami (Fig. 58) about twice width of shaft. Face nearly as in the preceding species. Similar to the preceding species, but forewing much paler, approaching to *osacesalis* in colouration, but commencement of postmedian fascia at costa represented by double black bars, more widely separated from each other than in *gigantea*, costal-apical black mark much stronger than in *osacesalis*, subterminal clouding greyish brown, indistinct as in *osacesalis*, apical area creamy white. Hindwing with postmedian double lines consisting of two blackish lines, subterminal fascia also consisting of two double lines, but inner ones incomplete, apex more produced than in *gigantea*, subterminal fascia strongly tinged with blackish, its outer margin angled at posterior margin of cell. Length of forewing: 25 mm.

♂ genitalia (Fig. 73). Valva less elongate than in *osacesalis*, ventral margin smooth, harpe about identical, central process of gnathos much more slender and uncus thicker than in *gigantea*.

Specimen examined. Holotype, ♂ : CHINA : Shuang-jiang, 888 m, Yunnan, 2. vi. 1980, IZAS.

Distribution. Southwest China.

H. osacesalis of Zhu & Wang (1981 : pl. 26 : 692 ; *id.*, 1992 : 208, text-fig. 7, pl. 1 : 7) most probably belongs to this new species. They (1992) cite *Punica granatum* (Punicaceae) as a food plant.

***Herdonia thielei* sp. nov.** (Figs 13, 37, 38)

Male. Antennal rami (Fig. 59) about two and half times width of shaft. Face white at ventral half, grey-brown at dorsal half. Ostensibly very similar to *acutapex* in shape of wings, but forewing with apex more weakly falcate, white spotting below cell weaker, red-brown spot above tornus at termen heavier. Hindwing with postmedian and subterminal fasciae slender as in *acutapex*, centre of the latter striated with blackish brown. Length of forewing : 16–20 mm.

♂ genitalia (Fig. 74). Uncus much more slender than in *acutapex*, valva ampler, ventral margin more strongly protuberant at middle, saccus rectangular, gnathos with central process broader, tip rounded, aedeagus broader than in *acutapex*.

Specimens examined. Holotype, ♂ : BORNEO : Mt. Bawan, 300 m, Kalimantan Barat, Indonesia, x. 1989 (N. Nishikawa). Paratypes : WEST MALAYSIA : UluGombak Field Station, Selangor, 30 km N. of Kuala Lumpur, 24–31. ii. 1984, 1 ♂ (Lichtf. leg., W. Nässig), *ex* J. H. R. Thiele ; SUMATRA : Huta Padang, 500 m, E. of Prapat, 16. xii. 1992, 1 ♂ (E. W. Diehl).

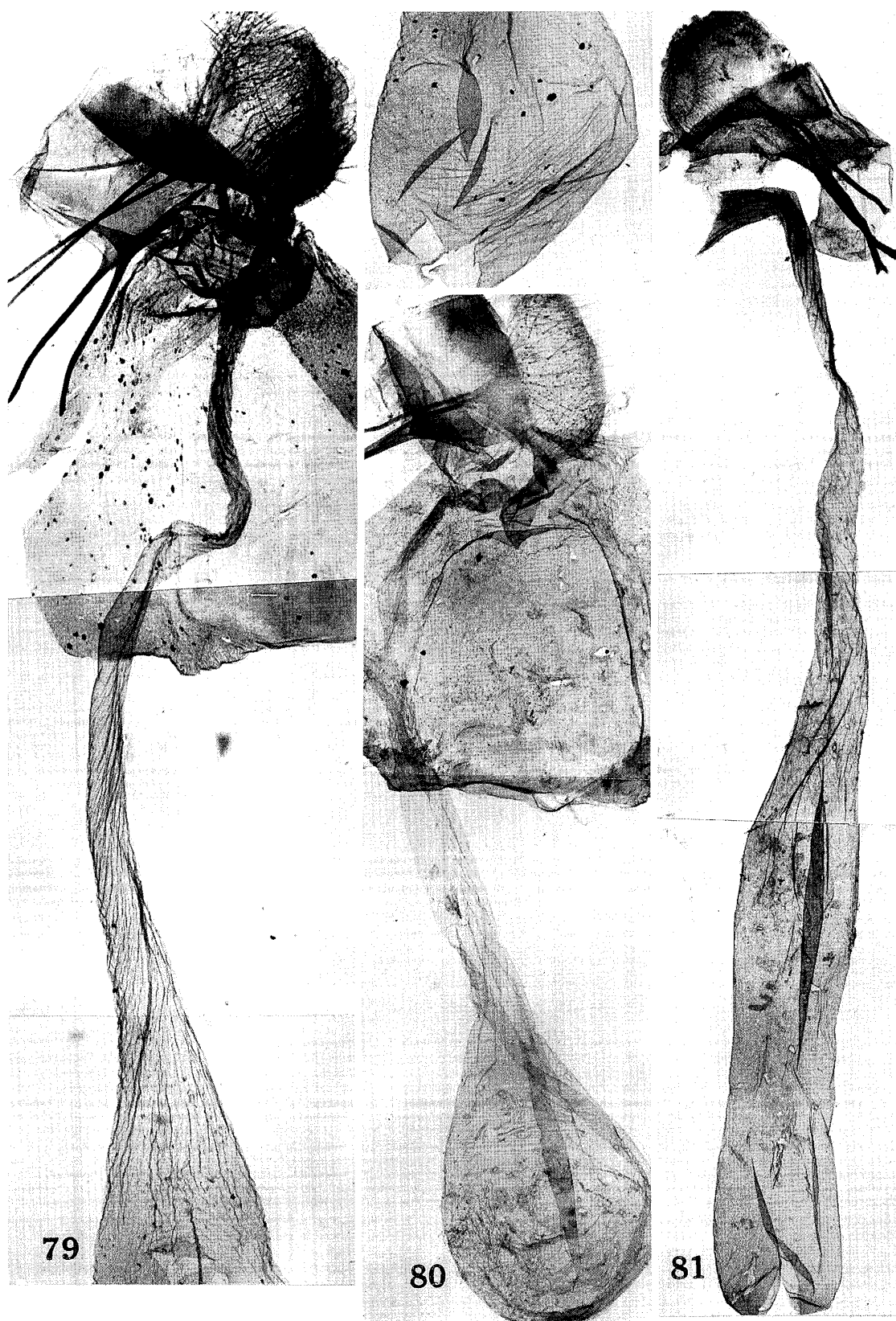
Distribution. Peninsular Malaysia, North Sumatra, South Borneo.

***Herdonia brunneola* sp. nov.** (Figs 14, 59)

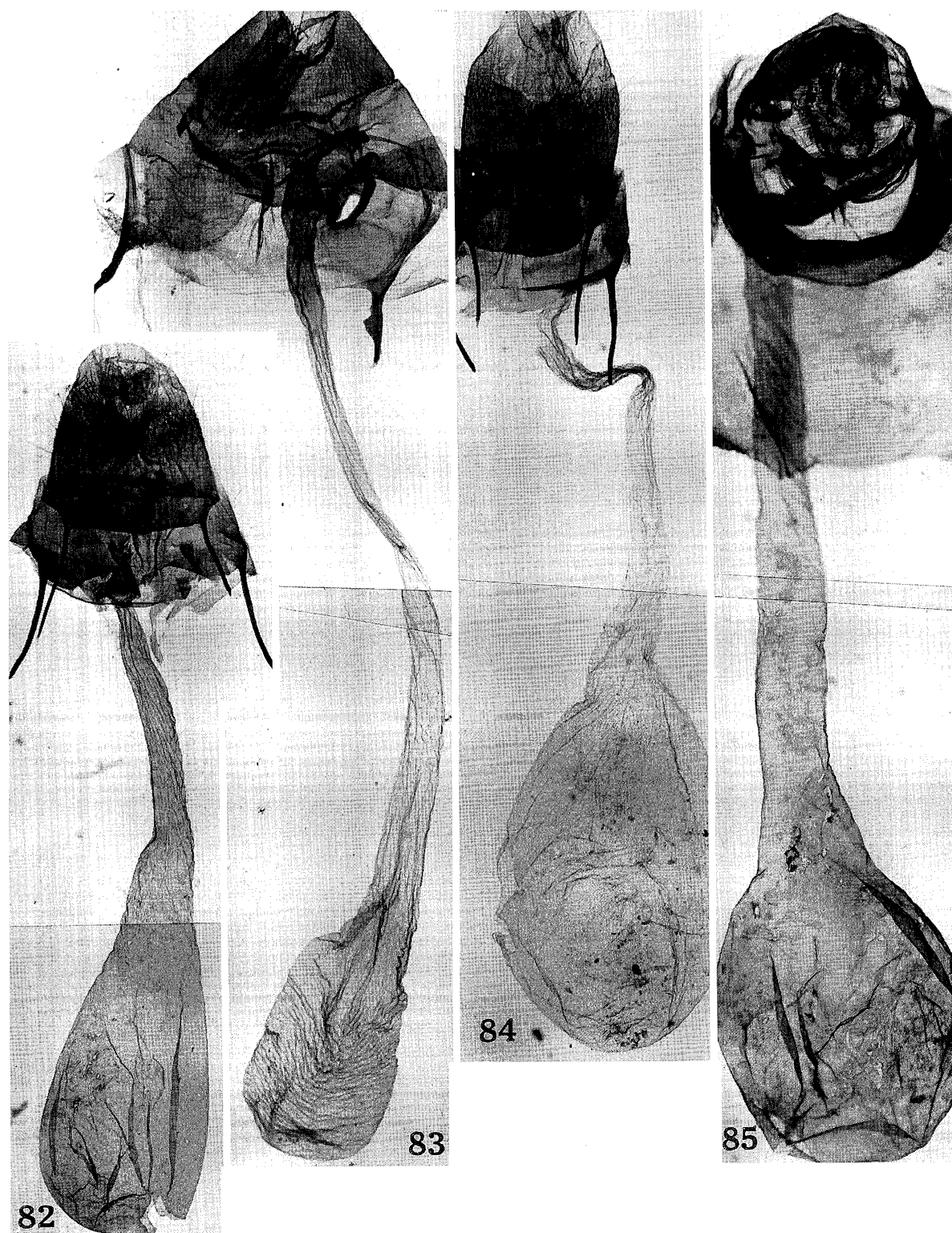
Male. Antennal rami (Fig. 60) slender, about four times width of shaft. Shape of wings very similar to *acutapex* and *thielei*, but apex of forewing more weakly falcate, termen more weakly gibbous. Smaller than the two species, about the size of *apoensis*. Forewing with postmedian fascia at costa as weak as in *thielei*, terminal fascia at costa greyish, white spotting below cell smaller, distal margin of subterminal clouding produced at M₁, tornus spotted with white. Hindwing with subbasal, postmedian and subterminal fasciae nearly as in *thielei*, at the interspace of subterminal double lines there are blackish brown striae. Length of forewing : 14–17 mm.

♂ genitalia (Fig. 76). Valva more slender than in *acutapex* and *thielei*, narrower at apex, ventral margin weakly undulated, harpe smaller than in the former, ring of gnathos narrower, but central process nearly identical in shape with *acutapex*.

Specimens examined. Holotype, ♂ : SUMATRA : Dauri-W, 1,200 m, 8. iii. 1981 (E. W. Diehl), *ex* J. H. R. Thiele. Paratypes : SUMATRA : Gunung Malayu, 80m, 4–5. v. 1983, 1 ♂ (E. W. Diehl), *ex* R. Sato ; Sidar Raya, iii. 1992, 3 ♂ ; Holzweg 2, near Prapat, iv. 1989



Figs 79-81. Female genitalia of *Herdonia* spp. 79. *H. osacesalis* (14705) (corpus bursae continues to upper centre). 80. *H. sundana* (14567). 81. *H. margarita* (14569).



Figs 82-85. Female genitalia of *Herdonia* spp. 82. *H. celebensis* (14587). 83. *H. thaiensis* (15454). 84. *H. gigantea* (14585). 85. *H. curiosa* (14702).

& 92, 2 ♂, *ex* J. H. R. Thiele; *ditto*, 16 & 22. xi. 1992, 3 ♂, *ditto*, 11. ii. 1993, 1 ♂ (E. W. Diehl); Sikakap, Pagai Isl., E. ii. 1992, 1 ♂ (Widakta), JHRT.

Distribution. North Sumatra.

Herdonia margarodes sp. nov. (Figs 15, 40)

Male. Antennal rami (Fig. 61) about twice width of shaft. Face sometimes fuscous at dorsal half and white at ventral half, but sometimes whitish all over, excepting brownish at crown. Forewing with R_4 and R_5 separate (3 specimens) or stalked (2 specimens). Forewing with apex not falcate as in *virginea*, termen very weakly convex; median and postmedian fasciae at costa brownish grey, triangular, the former much more compressed than the latter, subterminal fascia represented by a dot, terminal fascia at costa heavy, blackish, distal margin of subterminal clouding roundly produced at radials, terminal mark above tornus red-brown, blackish at termen, tornus spotted with creamy white, anterior half of terminal area whitish. Hindwing with termen straightish, subbasal fascia incurved in cell, postmedian fascia consisting of a double lines slender, closer to subterminal than to subbasal fascia at hindmargin, subterminal double blackish lines, incomplete striae running in-between, termen narrowly red-brown, inside of it broadly white. Length of forewing: 14-17 mm.

♂ genitalia (Fig. 77). Uncus slender, valva very narrow at apical area, ventral margin weakly convex at middle, gnathos with ring and central process slender, the latter long, nearly pointed at tip, aedeagus narrow for the genus.

Specimens examined. Holotype, ♂: WEST MALAYSIA: Cameron Highlands, 1984 (native collector). Paratypes: WEST MALAYSIA: data as holotype, 2 ♂; BORNEO: Mt. Bawan, 300 m, Kalimantan Barat, Indonesia, x. 1989, 1 ♂ (N. Nishikawa).

Distribution. Peninsular Malaysia, South Borneo.

Herdonia acaresa Zhu & Wang

Herdonia acaresa Zhu & Wang, 1992: 210, text-fig. 9, pl. 1: 9.

Unknown to me. Based on a single male from Jiangxi this species was described. It seems to be a close relative of *margarodes*, but still smaller (length of forewing: 11.5 mm), antennal rami shorter and less slender, forewing with apical-costal area not blackish, valva less slender at terminal half than in *margarodes*.

Distribution. Southeast China.

Herdonia deminuta sp. nov. (Figs 16, 41)

Male. Closest relative of *margarodes*, but antennal rami (Fig. 62) much more slender and longer, about three times width of shaft. Face white ventrally, grey-brown at dorsal two-thirds. Shape of wings almost identical with *margarodes*; forewing with maculation weaker, postmedian triangular mark at costa not so strong, terminal fascia at costa fainter. Hindwing with three fasciae duller in colour. Length of forewing: 14-17 mm.

♂ genitalia (Fig. 78). Uncus thicker, valva with ventral margin more weakly convex at

middle, gnathos with central process more slender than in *margarodes*, aedeagus broader than in it.

Specimens examined. Holotype, ♂ : WEST MALAYSIA : Cameron Highlands, 1982 (native collector), *ex* Y. Kishida. Paratypes : SUMATRA : Holzweg 2, near Prapat, 16. xi. 1992, 2 ♂ ; Samosir, 1,600 m, Is. in Lake Toba, 3. xi. 1992, 2 ♂ (E. W. Diehl).

Distribution. Peninsular Malaysia, North Sumatra.

Herdonia papuensis Warren, **sp. rev.** (Fig. 45)

Herdonia papuensis Warren, 1907 : 102 ; Dalla Torre, 1914 : 9.

Herdonia osacesalis papuensis : Gaede, 1932 : 745.

Female. Very similar to *sundana*, but wings broader, forewing with termen between apex and SM₂ more deeply incurved, costal-apical blackish brown mark stronger, creamy white spotting at hindmarginal area more developed, cloud-like subterminal brownish fascia with distal margin gently rounded at dorsal part, while in *sundana* it is angled at M₂. Hindwing with postmedian and subterminal double lines narrower than in *sundana*, recalling those of *acutapex*. Length of forewing : 24 mm.

Specimen examined. Holotype, ♀ : Biagi, Mambare R., 5,000 ft, B. N. G., April 06 (A. S. Meek), BMNH.

Distribution. Papua New Guinea.

Somewhat similar to *gigantea*, but forewing whiter, hindwing with postmedian and subterminal double lines closely approximated each other as in *acutapex*.

Gaede (1932, pl. 91 : d) says, "We figure a ♀ from Malacca, which probably belongs to this species, judging from the hindwing". Apparently the specimen he observed is not the true *papuensis*, but is similar to *acutapex* and *thielei*.

According to Mr Shaffer's personal information, the specimen figured by Watson & Whalley (1975, fig. 56x : ♂) as *osacesalis* is an undescribed species from New Guinea closely related to *papuensis*.

Herdonia celebensis sp. nov. (Figs 7, 42)

Female. Face white, strongly mixed with greyish scales at dorsal half. Shape of wings almost identical with *osacesalis*, but hindwing with termen gently rounded. Forewing white, contaminated with grey, hindmarginal area white with greyish strigae below cell, median, postmedian and subterminal fasciae very clear at costa, postmedian consisting of double lines, continuing to hindmargin, median fascia also very clear at hindmargin, represented by several streaks, subterminal small black dot at costa, reappearing at R₄ as double streaks, subterminal maculation above M₂ and below CuA₁ conspicuous, blackish brown, from termen below CuA₂ to tornus narrowly white. Hindwing with subbasal fascia angled at ventral margin of cell, postmedian and subterminal two double lines, interspaces widely apart, displaying white ground colour, termen narrowly brownish. Length of forewing : 28 mm.

♀ genitalia (Fig. 82). Ostium shortly sclerotized, ductus bursae shorter than long and

narrow corpus bursae.

Specimen examined. Holotype, ♀ : SULAWESI : Nr North border, Puncak Dingin, 1,700 m, x. 1985 (S. Nagai).

Distribution. Sulawesi.

Forewing veins R_4 and R_5 are stalked. Its colouration of forewing and maculation of hindwing are quite distinct from other congeners.

***Herdonia curiosa* sp. nov.** (Fig. 43)

Female. Palpus much more slender than in the typical species, 3rd joint much longer than 2nd, over diameter of eye, hindtibia without median spurs. Face dark greyish brown, central area much paler. Wings much more elongate than the typical species, but venation almost identical with them, R_4 and R_5 of forewing long-stalked, M_2 and M_3 running closely approximated for a short distance from lower angle of cell, then diverging. Forewing with apex falcate, termen strongly gibbous at middle; pale yellowish white, striated with dark grey at basal and subterminal area, costa spotted and dotted with dark grey at starting points of fasciae, antemedian double lines conspicuous below cell, postmedian double lines vanished at radials, then reappearing, running from M_2 to hindmargin, the lines continuing to hindwing, termen with a red-brown mark at medial veins. Hindwing with a faint subterminal line. Under surface nearly identical with upper, but blackish marks of costa of forewing stronger. Length of forewing: 24 mm.

♀ genitalia (Fig. 85). Ostium much more strongly sclerotized than in the typical species, ductus bursae broader than in the other species, more than twice longer than globular corpus bursae.

Specimens examined. Holotype, ♀ : WEST MALAYSIA : UluGombak Field Station, 30 km N. of Kuala Lumpur, Selangor, 26-28. i. 1984 (W. Nässig). Paratype : WEST MALAYSIA : type-locality, 1-3, ii. 1984, 1 ♀, JNRT.

Distribution. Peninsular Malaysia.

When males are found this species will require a new genus, because the condition of palpus, shape of wings, ground colour and maculations are anomalous for *Herdonia*.

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摘 要

マドガ科 *Herdonia* 属の研究 (井上 寛)

マドガ科のなかでは大型で、特異な翅型や斑紋をもった *Herdonia* 属は、日本産として知られている *H. margarita* Inoue ギンスジオオマドガ (モリヤママドガ) を含め、5 種が知られていた (但し本文で種に昇格させた 1 種を含む)。西はインドから東はニューギニアまで、旧北区東部と東洋区に分布し、多くの種を抱括する属なのに、今まで分類学的な研究がほとんどなされていなかった。本文では、15 新種を含め 20 種を記載または再記載したが、スンダランドやニューギニア方面には、更に未記載種が生息しているものと推定される。

ギンスジオオマドガは、日本では人里昆虫で、幼虫がサルスベリの小枝に食入することが知られている (六浦, 1958)。今回同じ種が中国から発見され、日本産が中国からの移入種である可能性が深まった。

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